

TAXONOMY OF *BUFO VENUSTUS* PHILIPPI, 1899
(ANURA: LEPTODACTYLIDAE) FROM CENTRAL CHILE

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Abstract.—The frog *Bufo venustus* Philippi, 1899, is shown to be a species of the genus *Telmatobufo* but not conspecific with *T. bullocki*. The species is re-described, and some notes on its natural history are presented.

Philippi (1899) described *Bufo venustus* on the basis of three frogs collected in Cordillera de Chillán (Andes Range, Chillán Province), and one frog from San Ignacio de Pemehue (Cautín Province), Chile. Donoso-Barros (1972) without osteological analysis of the holotype suggested that this species should be transferred to the genus *Aruncus* Philippi, 1902, and considered *Telmatobufo bullocki* Schmidt, 1952, conspecific with *A. venustus*. Lynch (1978) placed the species in the genus *Telmatobufo*, but the frogs (KU 159811 and 161439) analyzed by Lynch were true *T. bullocki* rather than *venustus*.

Recently one frog with external similarity (habitus and color pattern) to Philippi's description of *Bufo venustus* was collected in Alto Vilches, Chile (Talca Province, 1280 m). The color of the holotype could not be checked by Donoso-Barros (1972) because its original color is lost (it is whitish in alcohol).

In order to establish the taxonomic status of *B. venustus* we analyzed the osteology (skull and pectoral girdle) of the holotype (MUZUC 205051) and the Alto de Vilches' specimen (DBG 0784) as well as the external morphology of both frogs. Characteristics were compared with those of *Telmatobufo bullocki* and with *Telmatobufo australis* Formas, 1972.

As result of the study we concluded that *Bufo venustus* belongs to the genus *Telmatobufo* because the paratoid glands are well developed, the pectoral girdle is arciferal with the omosternum short and the sternum broad. The frontoparietals are nearly meeting at the midline, the nasal bones are medium-sized and broadly separated. The maxillary arch is complete and the cultriform process of the parasphenoid reaches the prevomerine teeth. *Telmatobufo bullocki* Schmidt, 1952, is not conspecific with Philippi's species, differing in color pattern and morphology of the foot.

Telmatobufo venustus (Philippi, 1899)

Fig. 1

Bufo venustus.—Philippi, 1899:723. Chile: Cordillera de Chillán.

Aruncus venustus.—Donoso-Barros, 1972:109–116.

Telmatobufo venustus.—Lynch, 1978:24–27.

Holotype.—MUZUC 205051, an adult female from Cordillera de Chillán, Chillán Province, Chile, approximately 1200 m, collected in January 1897 by Germain.

Diagnosis.—*Telmatobufo venustus* is a moderate size frog that is distinguished from its congeners in having dorsal and ventral areas black, the dorsum, head,



Fig. 1. Living specimen (above) and holotype (below) of *Telmatobufo venustus*.

and paratoid glands spotted with orange, and the outer border of the fifth toes broad and not glandular.

Description.—This redescription is based on two specimens, the holotype and one juvenile (DBG 0784). Body robust, limbs long and slender. Head depressed, slightly wider than long; head length 33.2% of snout-vent length; snout short, truncate (slightly concave in holotype). Lateral nostrils protruding; nostrils closer to the tip of snout than to eye. Eye length greater than distance between eye and nostril; internarial distance greater than interorbital distance. Tympanum absent; paratoid glands large, oval, greater than diameter of eye. Tongue rounded; pre-vomerine teeth in two separated fascicules between large choanae.

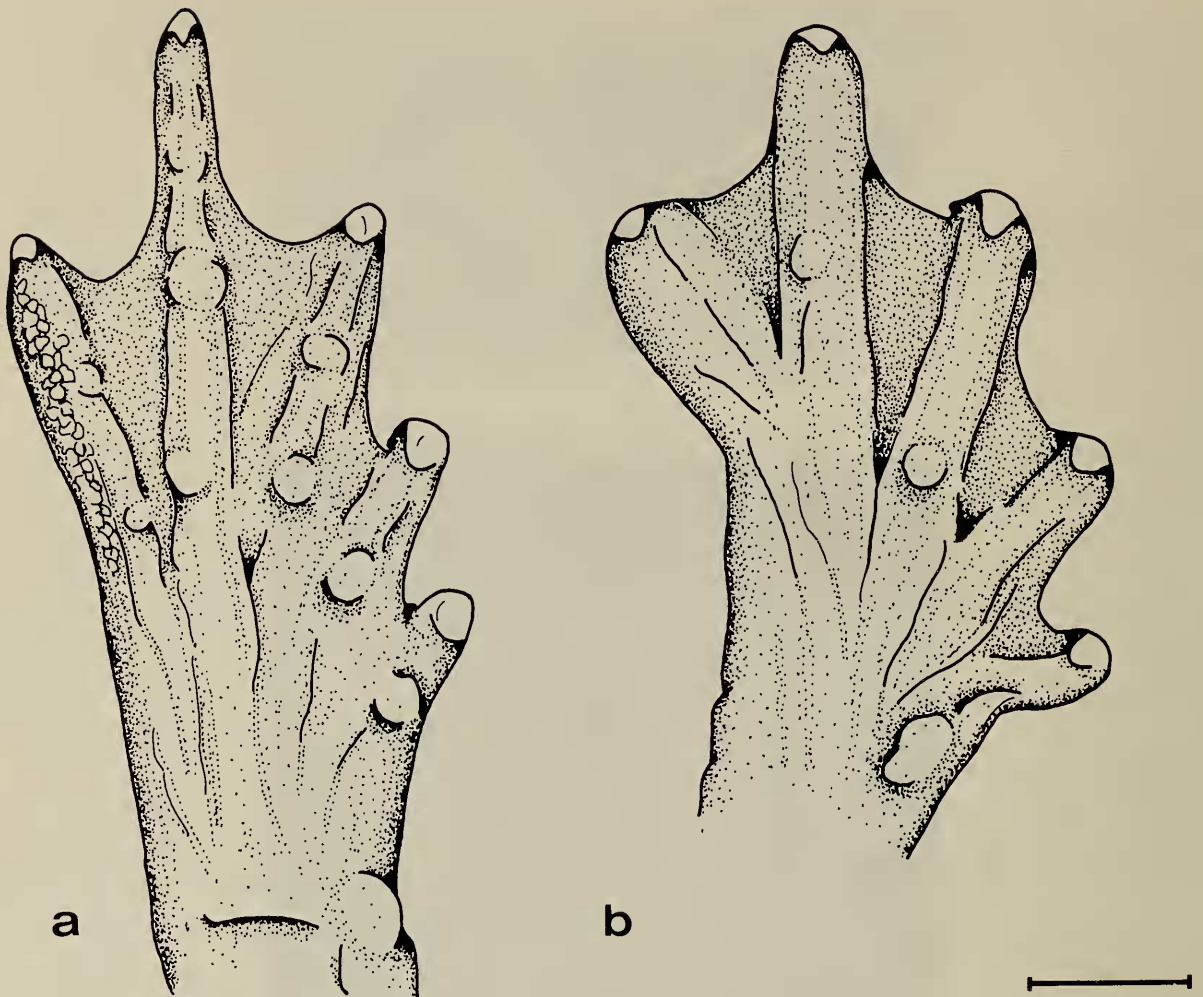


Fig. 2. Foot of (a) *T. bullocki* and (b) *T. venustus*. Scale = 5 mm.

Posterior limbs thin; tibiotarsal articulation reaching to anterior edge of paratoid gland (in DBG 0784). Toes webbed (Fig. 2b), interdigital membrane extending to tips of toes; length of toes in decreasing order 4, (5-3) 2, 1; inner metatarsal tubercle flat, indistinct; outer metatarsal tubercle absent; outer border of the fifth toe broad and not glandular; subarticular tubercles indistinct; tarsal fold present.

Forelimbs thin; upper arm enveloped in folds of skin of body; fingers free, their lengths in decreasing order 3-4-2-1; inner palmar tubercle evident; elongated gland in ulnar position of forearm extending from elbow to hand.

Skin of dorsum with numerous prominent, oval and round glands (less prominent in holotype); skin of venter smooth.

Color in preservative, whitish in holotype and black with irregular whitish spots in the juvenile. In life this animal had the venter, dorsum and extremities bright coal-black; head, paratoid glands, upper eyelids, elbow and tibiotarsal articulation areas orange spotted; two orange paravertebral stripes convergent below paratoid glands; minute yellow spots on flanks, dorsal and posterior thigh, dorsal surface of tarsus, and inner edge of forearm; tips of fingers and toes yellow. The color pattern of the living DBG 0784 here described agrees with Philippi's description of the holotype.

Osteology.—Pectoral girdle arciferal. Clavicles arched and not in contact me-

Table 1.—Measurements (mm) of *Telmatobufo venustus*, *T. bullocki*, and *T. australis*.

	<i>T. venustus</i> MUZUC 205051 DBG 0784		Range	$\bar{x} \pm SD$	<i>T. australis</i> IZUA 934-A IZUA 1778-A	
	Holotype	Juvenile			Holotype	Juvenile
Snout-vent length	70.8	46.9	80.0-58.4	69.7 \pm 7.7	40.0	70.6
Head width	24.9	19.4	29.5-23.8	28.3 \pm 2.4	18.0	27.0
Head length	23.5	17.6	28.1-21.1	25.4 \pm 2.0	19.0	23.0
Thigh length	28.1	22.7	38.0-25.4	32.2 \pm 4.5	18.0	33.4
Shank length	29.4	21.2	37.0-28.0	31.0 \pm 3.8	16.0	30.8
Foot length	46.5	31.9	61.1-46.8	52.4 \pm 9.0	21.0	52.2
Paratoid length	10.6	7.6	14.0-8.5	10.2 \pm 1.6	6.1	11.0
Eye diameter	8.3	6.2	9.8-7.1	8.5 \pm 0.9	5.9	8.2
Eye-nostril distance	2.9	3.3	5.3-4.6	4.9 \pm 0.2	3.7	5.3
Nostril-snout distance	5.3	2.1	11.2-3.5	6.4 \pm 3.0	3.9	5.5
Internarial width	7.7	5.1	7.0-6.3	6.7 \pm 0.3	4.9	8.3
Interorbital width	6.5	4.4	8.0-6.5	6.8 \pm 0.6	4.4	7.0

dially, coracoids expanded at distal and proximal ends; epicoracoidal cartilages free and broad; sternum very broad, slightly notched; omosternum broad and short, not ossified as sternum.

Cranial osteology.—The skull of the holotype of *T. venustus* and DBG 0784 were studied by radiographs. Frontoparietals paired, nearly meeting along the midline, sutured posteriorly and resting on the otoccipital; anteriorly resting on the sphenethmoid. Nasal bones medium-sized and broadly separated, the maxillary processes not contacting the maxillae; margins of nasals resting on anterolateral margin of sphenethmoid. Sphenethmoid extending slightly anterior to nasals. Maxillary arch complete and quadratojugal of moderate size. Zygomatic ramus of squamosal long, otic ramus shorter. Parasphenoid triradiate, cultriform process long, reaching prevomerine teeth. Pterygoids small and strong, their median rami short. Palatines broad, extending onto edge of sphenethmoid. Prevomers medium-sized, broadly separated, bearing 3-4 fang-like teeth. The skull of this species has the same osteological characteristics described by Lynch (1978) for *T. venustus* (= *bullocki*).

Comparisons

Telmatobufo venustus shows a remarkable color pattern which is different from *T. bullocki* and *T. australis*. In preservative (alcohol) the dorsum is brown in *T. bullocki*, and gray in *T. australis*. The venter is clear gray in *T. australis* with dark irregular spots on a whitish background (Formas 1972, 1979); *T. bullocki* shows this area mottled with brown (Schmidt 1952). In life, orange spots and stripes are absent in *T. australis* and *T. bullocki*. The latter species always has a yellow stripe between the eyes and some specimens show a yellow reticulate pattern among the warts (Pefaur 1971). In life the juveniles of *T. australis* are dark green with two yellow paravertebral stripes (Formas 1972).

The outer side of the fifth toe of *T. venustus* is broader than in *T. bullocki* and no glandular areas are present. *Telmatobufo australis* does not show this glan-

dular fold on the outer side of this toe. The tips of the toes of *T. bullocki* and *T. australis* are pointed, whereas in *T. venustus* they are rounded (Fig. 2a, b). The cranial osteology of *T. venustus* agrees with the description of the skull given by Lynch (1978) for *T. bullocki* (KU 159811), and the pectoral girdle agrees with Schmidt's (1952) illustration. Formas found the same cranial patterns and pectoral girdle morphology in *T. australis*.

Measurements of *T. venustus*, *T. bullocki*, and *T. australis* are given in Table 1.

Natural History and Distribution

Only four specimens of *T. venustus* were obtained by Philippi, one from San Ignacio de Pemehue (Cautín Province) and three from the Cordillera de Chillán. The newly collected specimen from Alto de Vilches (the northernmost locality from which *T. venustus* is known) was found under a *Nothofagus* log on 10 September 1979. The following food items were identified in DBG 0784: one snail, one adult coleopteran, one adult and one larval of dipteran, one adult hemipteran, and plants. One of us (Velo) observed that its swimming activity consisted of asynchronic movements of the extremities, like those described by Donoso-Barros (1972) for *T. bullocki*. In the laboratory, the frog remained with the nares outside the water and never was observed immersed. The eggs are creamy-white in color. The paucity of collected specimens of this species suggests to us that the populations of this frog are small.

Specimens Examined

Abbreviations.—Instituto de Zoología, Universidad Austral (IZUA); Museo de Zoología Universidad de Concepción (MUZUC); University of Kansas, Museum of Natural History (KU); Chicago Field Museum of Natural History (CNHM); Departamento de Biología Celular y Genética, Universidad de Chile (DBG).

Telmatobufo bullocki: CHILE: CNHM 23842, 31618, Cerros de Nahuelbuta, Malleco Province; KU 18438, 159811, Los Lleulles, Malleco Province. MUZUC 11644, Lota, Concepción Province; 12276, Elicura, Concepción Province; 12266, Ramadillas, Arauco Province; IZUA 1563, Ramadillas, Arauco Province; 1858-9, Caramavida River, Arauco Province. DBG, uncatalogued, locality imprecise.

Telmatobufo venustus: CHILE: MUZUC 205051, Cordillera de Chillán, Chillán Province; DBG 0784, Alto de Vilches, Talca Province, 1280 m.

Telmatobufo australis: CHILE: IZUA 934-A, 1778-A, Cordillera Pelada, Valdivia Province.

Acknowledgments

We are grateful to Francisco Silva and Carlos Vivar (Universidad de Valparaíso) who collected the specimen (DBG 0784), and Jorge Artigas (Universidad de Concepción) for making specimens available for our study. The first author wishes to express special thanks to William E. Duellman who provided facilities and made specimens available during his stay at the University of Kansas. Sonia Lacrampe and M. Inés Vera gave us technical assistance. This study was partially supported by the Dirección de Investigación y Desarrollo, Universidad Austral de Chile (Proyecto S-79-3).

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